APPENDIX 1

LANDSCAPE DESIGN GUIDELINES

What are Design Guidelines?

The *Local Government Act* of the Province of BC enables the Regional District to outline requirements for the form and character of commercial, industrial, and multiple family development such as appearance and landscaping. The guidelines provide conditions for applicants in developing plans, and a framework for evaluation of those plans by staff and the Regional Board.

1. Landscape Design Goals

1.1. Plants fulfill a multitude of purposes such as visually improving and softening the impact of buildings and parking, screening unsightly land uses, moderating the temperature, and improving air quality. People feel an innate connection to the world around us and living plants contribute to our physical and mental well-being. Landscaping is seen as a positive and desired contribution to the community in the urban environment.

1.2. Landscaping must consist of a variety of trees and shrubs in a cohesive design.

1.3. Landscape plans must respect and improve the views from public areas. The view of any development from the street is important. It creates the initial impression of the development and contributes to the overall character of the area.

1.4. Landscape plans must respect and improve the views from neighbouring residential properties. It is important that any development adjacent to residential areas be a "friendly" neighbour. Neighbouring residential uses should be buffered and screened with landscaping and fencing.

1.5. Trees filter air, moderate the temperature and are of great visual and environmental value. The planting of trees must be incorporated into landscape plans.

1.6. Water is a limited commodity in the Okanagan valley. The use of water conservation measures is important.

All landscape plans should be developed based upon the Landscape Design Goals, in consideration of the following landscape design guidelines.

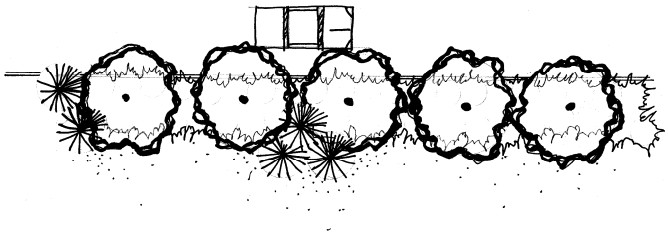
2. Views from public areas (such as roads, schools and parks)

2.1. Landscaping should be provided;

2.1.1. Along property lines that are next to public areas.
2.1.2. Along the base of buildings that are seen from the public areas.
2.1.3. Between parking areas and public roads.

2.2. All front yard setbacks should be landscaped.

2.3. Within any landscaped area fronting a public road street trees (several regularly spaced trees of one species) are to be provided at no more than 9 meter intervals and are to be at least 2.5 meters tall. The planting of other trees in addition to the street trees is strongly encouraged.



Street trees are required along roads.

3. Views from residential areas

3.1. Landscaping and buffering is to be provided next to any adjacent residential area. The entire setback should be landscaped in trees and shrubs.

3.2. Landscaped berms create a visual buffer. Even a small elevation change in the ground has an impact. Berms are encouraged especially where the creation of a visual screening effect is desired.

4. Parking, vehicular traffic, and waste collection areas

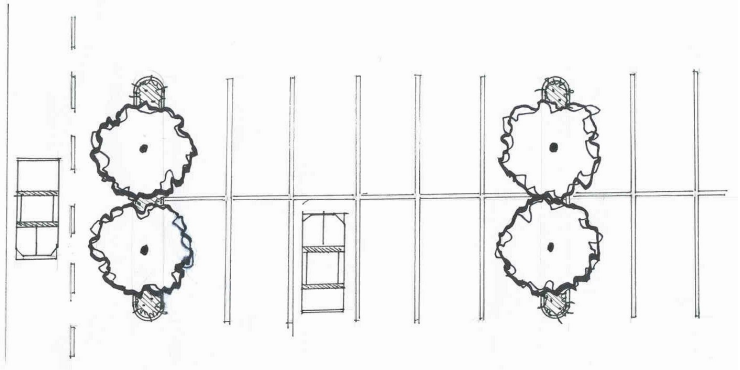
4.1. Outdoor storage or waste collection areas should be screened by fencing, hedging or landscaping.

4.2. Where landscaping is adjacent to parking or vehicular traffic there should be a concrete curb to protect the landscaping from damage.

4.3. In parking areas, landscape islands of trees and shrubs should be used to visually break up large expanses of parking. They are encouraged;

4.3.1. Between internal collectors (not used for direct access to parking stalls) and aisles that provide direct access to parking stalls,

4.3.2. At the end of aisles.
4.3.3. In mid-aisle to interrupt long aisles of parking stalls.



Trees and landscaping improve the parking environment for people and visually softens the impact of asphalt.

5. Existing landscaping

5.1. Integration with, or augmentation of, any existing landscaping is encouraged.

5.2. Retention of existing trees and integrating them into the proposed site and landscape design is encouraged.

6. Cohesiveness

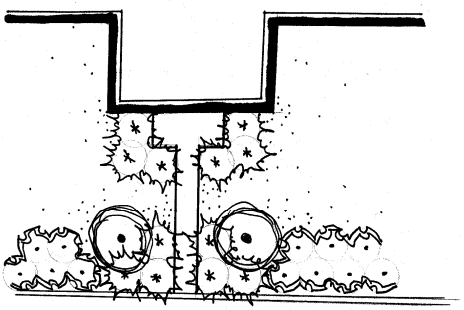
6.1. To create visual cohesiveness, choose a few types of plants and use them repeatedly in groups throughout the site. This creates overall visual continuity as opposed to a hodge-podge of "one of everything".

6.2. It is best to use a particular type of plant in odd number groupings (7, 9, 11 etc).

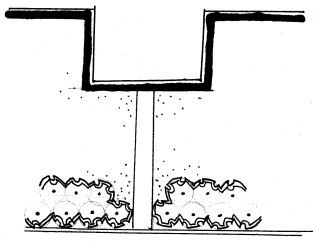
7. Focus

7.1. A change in the type or number of plants can be used to create a focus. That focus is important;

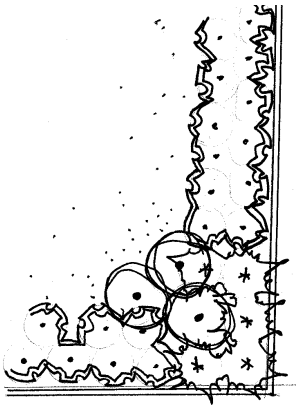
7.1.1. At entrances onto the site for either cars (driveways) or people (sidewalks),
7.1.2. Near important entrances and doors into buildings.
7.1.3. To emphasize changes in architecture.
7.1.4. At intersections, if the property is on a street corner.



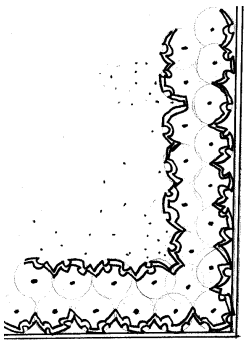
Focus created by the use of landscape material



No focus



Focus



No focus

Landscaping can create a focus at a street corner or where cars access the site.

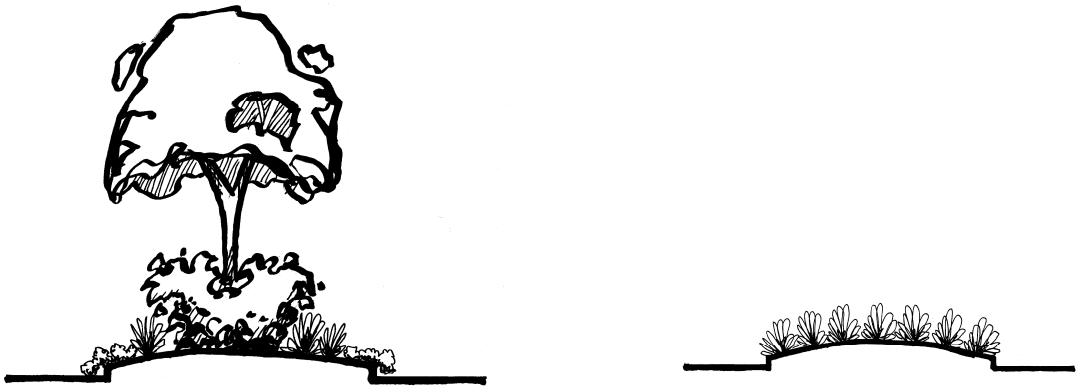
7.2. A focus is created by:

7.2.1. Changing the shape of the landscaped bed.
7.2.2. Using more landscaping at the focus.
7.2.3. Using a certain type of plant(s) or a specimen plant only at a focus.

8. Depth and Variety

8.1. Plant types should be selected such that there is interest provided in all four seasons. The use of at least one type of evergreen tree or shrub is encouraged.

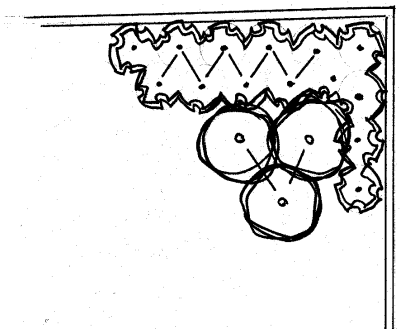
8.2. To increase variety and interest, choose different types of plants that will grow to be various heights. Include a combination of groundcovers, shrubs of various heights and trees.



Groundcovers, shrubs and trees create variety. One height is visually monotonous.

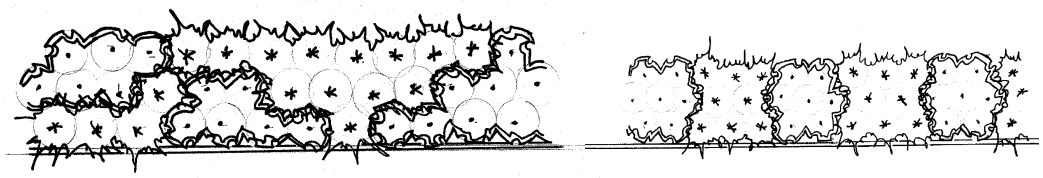
8.3. Visual depth is produced by;

8.3.1. Staggering plant material. Each plant is slightly offset from the next.



Staggered plants create visual depth and a natural appearance.

8.3.2. Layering plant material in a landscaped bed from one side to the other. Rather than one species across the entire depth of the bed, a few species are placed one behind the other to create a visual layering affect. Different plants are weaved in front and behind each other rather than placed in a linear series of regimented groups.



Layering creates depth and visual variety … versus no layering

9. Plant spacing

The distance between plants is called "on-centre spacing" and is measured from the centre of one plant to the centre of the neighbouring plant. The distance is based upon ensuring the plants fill in in a reasonable amount of time, yet are far enough apart to avoid overcrowding. Areas that require a development permit often have a relatively high public profile, therefore adequate plant density is important.

9.1. An acceptable "on centre" spacing will result in the landscape completely filling in in about 5 years time. On-centre spacing is very species dependant and typically varies as follows;

9.1.1. Groundcovers (such as arctostaphylos, cotoneaster, paxistima canbyi) – 6 inches to 2 feet on centre.
9.1.2. Small shrubs (such as spiraea japonica, potentilla fruticosa) – 2 to 3 feet on centre.
9.1.3. Medium shrubs and junipers (such as many hardy shrub roses, spiraea bumalda, cornus alba, pinus mugo)– 3 to 4 feet on centre.
9.1.4. Large shrubs (such as forsythia intermedia, many syringa, amabilis , cotinus coggygria – 4 to 5 feet on centre.

(The plants mentioned as examples of shrub size are not a complete list and are only general examples. Some species may have varieties that are larger or smaller, for example winged-burning bush, euonymous alatus, is a large shrub whereas euonymous alatus "compactus" is a medium sized shrub)

10. Shrub size

It is important that there be a good initial appearance and that landscaping not take too many years to fill in. Planting very small plants will reduce and delay the intended visual effect.

10.1. Unless a groundcover, all shrub material must be at least 2 gallon (#2) size.

If the landscaping covers a particularly large area, a reduction in size may be considered by the Regional District for one or more plant types. This would be contingent on plants in areas of high visual impact (such as at areas of focus discussed previously) being of an adequate container size to visually compensate for the other plants being less than a #2 pot size.

11. Standards

11.1. Plant material in the specified container size must meet the BC Landscape Standard for size and leaf density. (The BC Landscape Standard is published jointly by the BC Society of Landscape Architects and the BC Landscape and Nursery Association).

11.2. All trees shall be staked in accordance with the BC Landscape Standards. (The BC Landscape Standard is published jointly by the BC Society of Landscape Architects and the BC Landscape and Nursery Association).

11.3. All planted areas are to be covered with landscape fabric and mulched.

11.4. All landscaped areas must be irrigated. Low volume irrigation methods are encouraged. A Xeric (dry land) landscape design must still have an irrigation system to ensure survival during the initial years and to provide some water if required after the landscape is established. A low volume irrigation method is encouraged.

12. Plant material that is prohibited

12.1. There are certain plants that may harbour damaging diseases that can be transmitted to commercial orchards and vineyards in the Okanagan. The following types of plants are not permitted as part of planting plans;

12.1.1. All trees of the genus MALUS (apples or crabapples, including all ornamental or flowering crabapples).
12.1.2. All trees of the genus PYRUS (pears, including asian and ornamental pears).
12.1.3. All trees of the genus PRUNUS (flowering cherries and flowering plum).
12.1.4. All plants of the genus CYDONIA (quince).
12.1.5. All plants of the genus CHAENOMELES (flowering quince or japonica).

(Note: All plants have a latin name consisting of two words. The first word is the genus name, the second is the species name. For example, a flowering cherry is Prunus subhirtella.)

Plant material that is drought tolerant

All plants need water but there are some plants that are more tolerant of low water conditions than others. The use of drought tolerant plants reduces the need for frequent irrigation and saves water. It is important to remember that adequate watering during the first year or two is very important to ensure long-term plant survival.

The following species are generally more drought tolerant than most and their use is encouraged. This is not a comprehensive list. There are many other plants available that are also low water consumers.

Ground cover
Arctostaphylos uva- ursi – Bearberry
Cotoneaster horizontalis – cotoneaster
Herocallis sp. – daylily
Thymus sp – thyme (esp. wholly thyme)
Vinca minor – periwinkle (shade or part shade only)

Shrubs
Amelanchier alnifolia – Saskatoon berry bush
Buddelia davidii – butterfly bush
Caragana - Caragana
Cornus stolonifera – red osier dogwood
Cornus alba – yellow twigged dogwood
Holodiscus discolor – Oceanspray
Juniperus sp. – Juniper
Lonicera japonica "Halliana" – Hall's Honeysuckle
Mahonia aquifolium – Oregon grape
Pinus mugo - Mugo shrub pine
Physocarpus opulifolius – Golden Ninebark
Potentilla fruticosa – Cinquefoil
Rhus – Sumac
Rosa sp. – wild rose types
Sambucus sp - Elderberry
Spiraea sp. – Spiraea
Symphoricarpus albus – Snowberry bush

Trees
Abies concolor – White fir
Ailanthus altissima – Tree of Heaven
Carpinus betulus - European hornbeam
Celtis occidentalis – Common Hackberry
Cladrastis lutea – American Yellowood

Fraxinus pensylvanica – White ash
Ginkgo biloba - Gingko
Kolreuteria paniculata –Golden Raintree
Morus alba – White mulberry
Phellodendron amurense – Amur corktree
Pinus ponderosa – Ponderosa Pine
Pinus sylvestris – Scotch Pine
Sophora japonica
Sorbus aucuparia – Mountain Ash
Tilia sp. - Linden
Ulmus parvifolia – Lacebark Elm

Plant material that is beneficial to birds.

The following plant material is beneficial to birds. The use of these types of plants as part of an overall landscape design is encouraged. If the plant is being used because it produces berries, cones or fruit, it is important to check with the plant nursery that the species you choose actually produces fruit. Many types of plants have some species (or varieties) that do produce fruits and some that don't.

Trees

Sorbus sp. (those that produce berries) – ash trees
Evergreen trees (those that produce cones)

Shrubs

Amelanchier sp. – serviceberry (also called Saskatoon berry)
Mahonia aquifolium - Oregon Grape
Rosa sp. (Those that produce rose hips in winter) – wild roses
Symphorocarpus sp. - Snowberry
Medium or large shrubs with a twiggy dense growth pattern (provides cover)

APPENDIX 2

AQUATIC ECOSYSTEMS DEVELOPMENT DESIGN GUIDELINES

Aquatic Ecosystem Development Permit Objectives and Design Guidelines

Characteristics

Aquatic ecosystems are wet ecosystems including and surrounding watercourses, lakes, streams, ponds, broadleaf woodlands and wetlands. Some of these ecosystems may be dry during the summer or frozen in winter. The geography and vegetation that surrounds, protects and interacts with the aquatic environment is called the riparian area. Together, the water and the riparian area form an aquatic ecosystem.

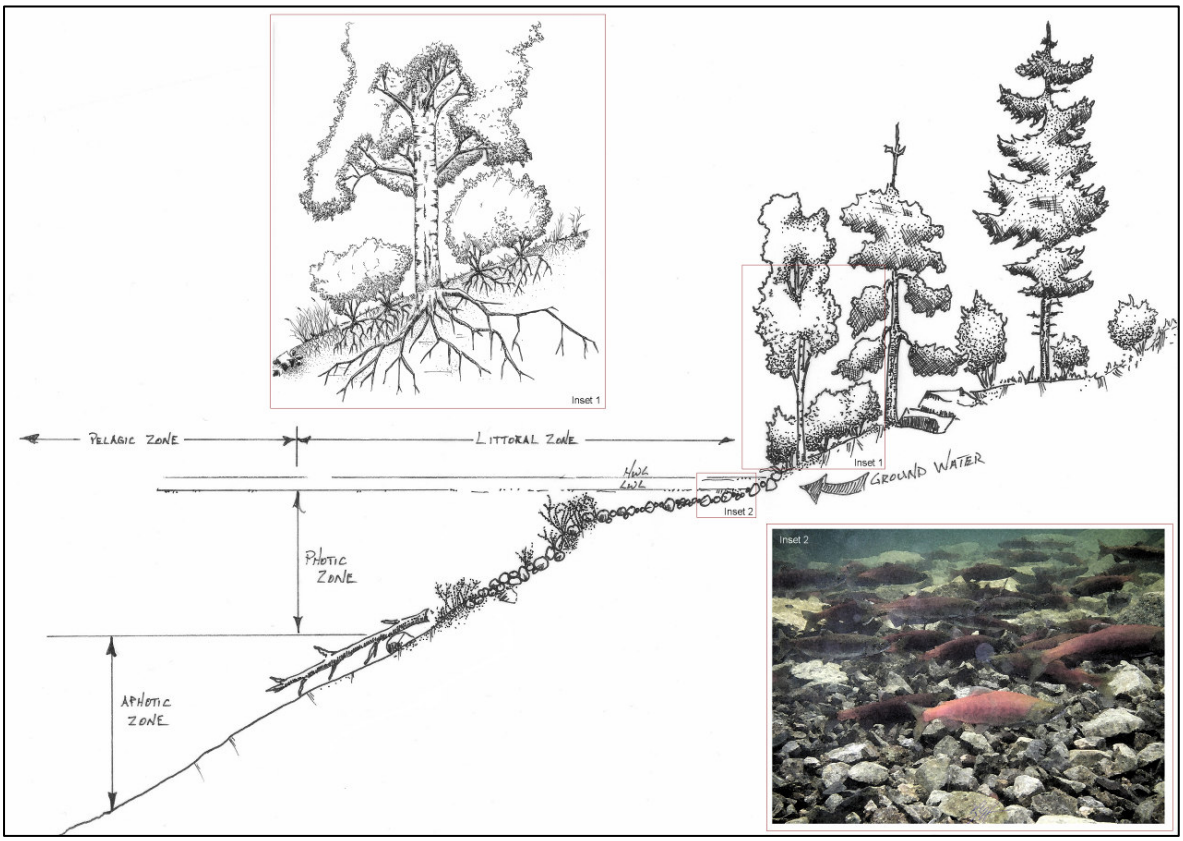


Illustration. Typical section of the North Westside shoreline of Okanagan Lake.

Aquatic ecosystems are protected not only because of their great importance to the ecology of the Okanagan but also because Provincial and Federal legislation (Riparian Area Regulation, the *BC Water Act*, and the *Federal Fisheries Act*) require that the RDCO ensure the protection of aquatic ecosystems.

Importance

The importance of aquatic ecosystems is far reaching and is only briefly summarized here. In the dry ecology of the Okanagan, aquatic habitats are critical for the survival of wildlife and form necessary travel corridors between habitats. Water is an important part of maintaining biodiversity and is essential for many species. Many rare species in the Okanagan are associated with aquatic environments.

The Okanagan also has a limited water supply and the water quality of surface water and aquifers (both below ground and in surface recharge areas) is important. The riparian habitat is a natural water purifier and pollution filtration system. A healthy riparian area also helps slow water flow and prevent erosion.

The entire water system is highly interconnected and fragile. A change in one part of a stream or wetland can have downstream consequences on wildlife, people and property. Finally, the quality of the aquatic environment will affect fish habitat and fish population numbers.

The Aquatic Ecosystem Development Permit Area (DPA) is designated in accordance with the *Local Government Act*. The Aquatic Ecosystem Development Permit Area provides protection for the natural environment, its ecosystems and biological diversity and, protection of development from hazardous conditions. Aquatic ecosystem development permits are for the protection of watercourses such as streams, ponds, and wetlands and the critical habitat and biodiversity in their riparian areas. Such ecosystems are important not only in their own right but form a backbone of corridors between ecosystems that create a healthy diversity and better support the needs of a variety of species. These connections avoid the creation of isolated "islands" and increase ecosystem sustainability for the future.

Aquatic ecosystems are protected not only because of their great importance to the ecology of the Okanagan but also because legislation of the Province of BC (the *Fish Protection Act*, the *Riparian Area Regulation*, and the *Water Act*) and Federal legislation (such as the *Fisheries Act*) all require that the Regional District ensure the protection of the aquatic ecosystem.

The *Trepanier Water Management Plan* completed in 2004 covered 5 major watersheds in the Okanagan. The report concludes that climate change will reduce water flows from current levels. Coupled with increasing demand there will be with future impacts on water quality, water availability, and changes to the natural environment.

The Aquatic Development Permit Area was established through the identification of stream and riparian areas utilizing a combination of field Inventory (using sub-metric global positioning system), interpretation of provincial TRIM[5] data, field surveys, and documentation of riparian locations.

[5] TRIM = Terrain Resource Inventory Mapping

Objectives

- To protect the ecological attributes and socio-economic values that is common to all Aquatic Ecosystems.
- To protect, restore and enhance Aquatic Ecosystems (water, wetland, riparian and broadleaf woodland).
- To protect Aquatic Ecosystems through the use of buffers.
- To protect water quality and quantity.
- To protect vital wildlife functions such as (but not limited to) a travel corridor, a place of refuge, water source, fish habitat, and a breeding habitat to ensure future generations.

Aquatic Development Permit Area Guidelines

- A leavestrip for the protection and restoration of the riparian ecosystem is to remain undisturbed near watercourses. The intention is that the leavestrip will be untouched by development and left in its natural condition, or, if damaged by previous use or construction, the ecosystem restored or enhanced.
- The leavestrip should be evaluated, established and monitored by a Qualified Environmental Professional (QEP) experienced in environmental assessment and design registered in the Province of BC following evaluation of the leavestrip requirements and recommendations.
- The assessment will include (but is not limited to) the consideration of:
    a. The Sensitive Ecosystem Inventory and Sensitive Habitat Inventory and Mapping Data and any other environmental information available from the RDCO or provincial ministries.
    b. Leave strips of sufficient width to accommodate the dynamic nature of the hydrologic system, maintain water quality, base flows and natural drainage patterns. A report prepared by a professional hydrologist may be required in circumstances where the hydrological condition has been or may be significantly disturbed.
    c. Provincial Best Management Guidelines pertaining to aquatic habitats, groundwater management and drinking water protection.
    d. An indication of when monitoring of important environmental conditions by the professional will occur.

- The Assessment Area will include:

    a. A 30-m band (horizontal plane) measured perpendicular from the mean annual highwater line (level) of the watercourse; For a ravine that is less than 60 m wide, from the top of the ravine to a spot 30 m beyond the top of the ravine; for a ravine that is more than 60 m wide, a strip that is 10 m wide from the top of the ravine.

- Leave strip widths will be determined based on the following factors:

a. If fish bearing or connected by surface water to a fish bearing water body:

- For **creeks and wetlands**, the leave-strip area will be no less than 15-m (horizontal distance) from the bankfull level of the subject watercourse. If the setback determined using the Detailed Assessment Methods of the Provincial Riparian Areas Regulation (RAR) exceeds 15-m, the leavestrip area will then comply with the Setback under the RAR.
- For an **active floodplain**, the leave strip (determined from (a.)) will start at the outer edge of this feature. *Active floodplain areas are those that are flooded more frequently than 1 in 5 years.* Seasonally inundated channels are to be included in the active floodplain;
- For **Okanagan Lake,** leave strips will be commensurate with the shoreline condition and adjacent aquatic habitat values and permitted land use will be harmonized with protection of these areas as assessed at the Provincial level (Based on Kokanee Shorespawning Values) through a Black/Red/Yellow/No Colour shoreline sensitivity and rating and activity risk matrix. (*Appendix 6).* Through continued work with the Province and the updating of the Foreshore Inventory Mapping and associated Aquatic Habitat Index, specific minimum setbacks may be set which reflect existing shoreline character (% disturbed). The proposed derived colour zones and setbacks are outlined in Table 1. The actually mapped area may vary depending on the update to the Foreshore Inventory Mapping and discussions with the Province. In the interim, the proposed shoreline sensitivity zones as outlined in Appendix 6 will be used as guidance for site specific development applications and will be subject to consideration from the Province as it relates to the critical black zones identified in the Okanagan Region Large Lakes Foreshore Protocol.

Table 1. Okanagan Lake Leave strip widths by Shoreline Sensitivity (*Appendix 6*).

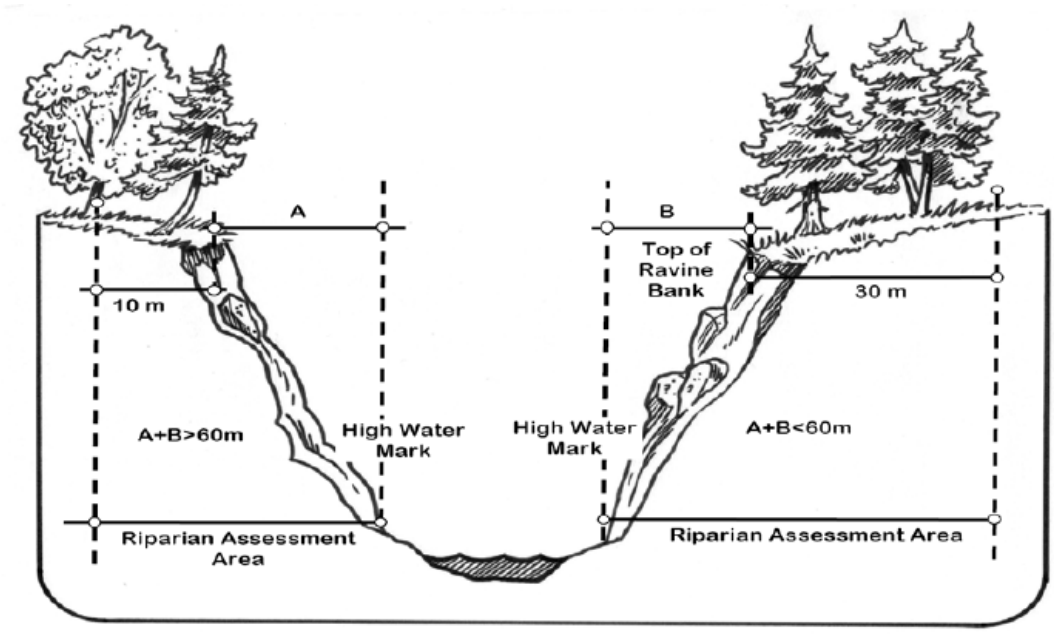
Shore Zone	Leavestrip
Red	30-m
Orange	20-m
Yellow	15-m

b. If **non-fish-bearing** and not connected by surface water to a fish bearing water body

c. Other considerations in determining an appropriate leavestrip include:

- Whether the watercourse has downstream water intakes.
- What the intended land use is within the property (both within and outside of the Development Permit Area).
- Whether the land use includes livestock storage, on site septic disposal, fuel storage, aggregate extraction, or other sources of potential surface or groundwater contamination.
- Proximity to stream or shore spawning areas.

- The location of the natural wetland, riparian and broadleaf woodland ecosystem communities.
- The location of important denning or nesting habitat.
- Ecosystem continuity off site and in the larger area.
- The extent of land clearing, berming, or removal of vegetation and topsoil.
- The timing of site work and rehabilitation.
- The natural slope of the land.
- In consideration of the guidelines of the development permit area.



- Leavestrips and open spaces should be linked to develop a continuous network of ecosystems.
- Networks of leavestrips, open spaces and foreshore may provide for public access where such access is designed in a way that is not detrimental to the natural environment.
- Where impact on the leavestrip may be permitted during construction, provisions should be in place to rehabilitate the leavestrip using native species. Rehabilitation is intended to restore or enhance the ecosystem in the leavestrip.
- Should damage occur to the leavestrip during construction, the RDCO may require a professional assessment of the damage and a report on recommendations for rehabilitation.

- All leavestrips may be required to be identified along their perimeter during all phases of construction by means such as brightly coloured snow fencing in order to prevent any accidental disturbance.
- Active bird nests and the nests of eagles, peregrine falcons, osprey, burrowing owls or heron (whether occupied or not) are protected by the provincial Wildlife Act. The provincial Develop with Care: Guidelines for Urban and Rural Land Development document has suggested minimum buffer distances that are based on scientific research and professional observation.
- Avoid the location of roads, driveways, and utility corridors along, parallel to, or across riparian ecosystems in order to maintain natural connectivity. Where it can be demonstrated that alternatives are not possible, design crossings that are narrow and perpendicular to riparian areas and elevated in order to maintain connectivity.
- Manage and minimize opportunities for livestock crossings and access to water.
- Maintain hydrologic regimes. Changes to surface and ground water flow can negatively impact aquatic, riparian, and wetland ecosystems. Trails and road construction and development should be designed to maintain the hydrology of these ecosystems. Inflow and outflow streams should not be diked or dammed.
- Maintain normal wetland and water processes such as flooding, seasonal drawdown, and groundwater recharge.
- Maintain entire intact ecosystems wherever possible discouraging any disruptive uses. Damage from motorbikes, ATV's, unplanned and unmaintained trails, mountain bikes and vehicles can easily adversely alter sensitive ecosystems and water quality. Manage access actively with fencing and railings.
- Riparian vegetation should be maintained where intact, or restored where disturbed or where invasive weeds have intruded.
- In general, development design should reflect the objectives and guidelines of the Develop with Care document produced by the Province of BC.

Specific Guidelines

The following specific objectives and specific guidelines pertain to the riparian and wetland ecosystem as identified by the Sensitive Ecosystem Inventory. They are in addition to the Objectives and Guidelines for aquatic ecosystems and relate to the important characteristics of that particular ecosystem.

Riparian Ecosystems

Characteristics – riparian ecosystems are defined as ecosystems that are adjacent to, and significantly influenced by a water body. That is, these sites are moister than, and have a plant community that is distinct from the surrounding upland. Riparian ecosystems are typically linear in nature. Wetlands are riparian in nature but were treated separately here because of their distinct ecological nature.

Riparian ecosystems are also divided into distinct classes (bench, gully, and fringe) according to their environmental and vegetation characteristics.

Vegetation maintains the cohesive nature of the stream bank, and reduces the power of the stream. During flood events, riparian vegetation catches fine nutrient-rich sediment, thus maintaining the productivity of the site. Without this vegetation, streams become wide and shallow, and sediment can accumulate in the stream channel where it may harm fish and reduce water quality. It can take many decades to stabilize denuded stream banks and restore narrow, deep stream channels. Riparian vegetation also provides inputs of organic matter into soils, which increases their capacity to absorb and store water. Additionally, riparian vegetation moderates water temperatures, provides an important source of food for many aquatic organisms, and provides important wildlife cover for nesting and feeding.

- Bench riparian ecosystems are flood or *fluvial* ecosystems. They have distinct characteristics that are associated with moving water such as creeks, streams and rivers. Bench riparian ecosystems are rich in nutrients, species and vegetation structural diversity. Generally, these sites are productive and develop more quickly after disturbance than adjacent upland sites. Typically, these ecosystems occurred as a band on either side of a creek and often formed natural corridors through the landscape. Soils of this ecosystem type are typically sandy and gravely, and were poorly developed. They usually have a mix of coniferous and deciduous trees in the overstory, with shrubby understories.
- Gully riparian ecosystems occur at the base and lower slopes of moderate to steep-sided linear sites (small valleys or ravines) with significant moisture. These ecosystems have either permanent or intermittent surface water flow, or significant subsurface flow, but are usually not subject to flooding. These are also rich and productive sites, and they form natural corridors through the area, providing habitat that is distinctly different from the surrounding landscape. These ecosystems usually have a mixed coniferous and deciduous overstory with shrubby understories. Slopes are often steep, and soils are variable.
- Lakes and ponds typically have fringe riparian ecosystems associated with their shorelines. Sandy, gravely soils were common in these ecosystems and soils are often gleysols or mottled. This class also includes sites on *fluvial fans*, and sites with significant seepage that are sensitive to soil and hydrological disturbances; soils are typically medium-textured on these sites. Within the North Westside OCP area, fringe riparian ecosystems are commonly associated with the Okanagan Lake foreshore, pond fringes, and moist seepage slopes. These ecosystems usually have mixed coniferous and deciduous overstories with shrubby understories.

Importance - According to the Sensitive Ecosystem Inventory the importance of this ecosystem includes its rarity (most riparian plant communities as listed with the CDC as rare), high biodiversity, fragility (sensitive to disturbance and changes in hydrology), aquatic habitat protection, water quality, wildlife corridors, flood protection and erosion reduction as well as social values.

Objectives specific to this ecosystem:

- To conserve as much of the ecosystem as possible. Where there are changes intended, maintain the key characteristics of the ecosystem as much as possible including:

    a. riparian vegetation;
    b. large cottonwood trees;
    c. threatened or endangered species or natural plant communities;
    d. natural processes such as stream flow, flooding, and stream channel movement;
    e. nesting or denning sites;
    f. standing dead trees, and downed trees and logs; and
    g. riparian corridors, and connectivity with upland communities.

Specific Riparian Guidelines:

- Discourage human settlement or other development within or adjacent to riparian areas.
- Riparian vegetation should be maintained where it is present, and restored where it has been lost.
- Manage access actively (e.g. with fencing and railings) to minimize the effects of recreation and other human uses.
- Where practical or necessary, restrict livestock access with fencing. To allow safe wildlife access, fences should be top-railed, page-wire should not be used, and bottom wires should be 45cm above ground level.
- Control pets. Pets should be restrained and hunting dogs should be trained away from riparian areas during the spring and summer. Other disturbances to waterfowl during the nesting season should also be avoided.
- Protect structural features: Large trees, snags, logs provide critical nesting habitat for many species of birds and animals. Large, old cottonwood trees and snags are especially important for birds, bats and other animals.
- Avoid use of pesticides in or near water and important foraging areas for wildlife. Pesticide use near foraging habitat for animals that feed on insects (e.g., Olive-sided Flycatcher and Common Night Hawk) should be avoided.
- Allow natural disturbances to occur. Flooding, windthrow, channel changes, slope failures and debris flows are recognized as important factors in the creation and maintenance of high diversity riparian habitats. These events and processes should be maintained as follows unless they pose a threat to safety or property.
- Minimize bank or flood protection. Human changes such as channel stabilization, deposition of rip-rap, and vegetation removal reduce riparian diversity and habitats.

- Maintain natural flow regimes. Deforestation, removal of vegetation, or increased impervious surfacing can result in significant increases in the size, duration, and frequency of floods. Bank erosion can also worsen.

Wetland Ecosystems

Characteristics - Wetlands occur on sites where the water table is at, near, or above the soil surface for a sufficient period of time to influence soil and vegetation development. Wetland ecosystems characteristically have plants that are adapted to growing on saturated soils with low oxygen levels. Wetlands were divided into distinct classes according to their environmental and vegetation characteristics. These classes included swamps, marshes, and shallow water ecosystems.

Wetlands are focal points for wildlife because of their infrequent occurrence in this landscape. Wetlands provide wildlife and biodiversity values that are disproportionate to the area they occupy on the land base. Wetland vegetation provides food, shelter, breeding habitat, and cover for many species of amphibians, reptiles, mammals, birds, and insects. Wetland vegetation provides food for many aquatic organisms. Ponds and shallow open water bodies are important watering sites for many species and provide painted turtle habitat, especially if floating logs are present. Wetlands are also sources of insects that provide food to birds and bats. Properly functioning wetlands store and filter water, and maintain water quality. They reduce the levels of sediment, nutrients, and toxic chemicals in outflow water.

Importance - According to the Sensitive Ecosystem Inventory the importance of this ecosystem includes its extreme rarity, high biodiversity, fragility, maintenance of water quality as well as social values.

Specific Wetland Guidelines*:*

- Discourage human settlement and other land developments within, or adjacent to, wetland areas. It is strongly recommended that such activities in and around wetlands be avoided. Roads should not be built near wetlands as they can alter hydrology and lead to extensive mortality of wildlife species that use wetlands.
- Maintain wetland hydrology. Draining or ditching in or around wetlands, the filling in of wetlands, and the discharge of stormwater into such sites should be avoided. Vegetation cover should not be removed as this increases surface runoff and reduces the amount of groundwater infiltration, thus reducing available summer moisture. Additionally, areas of impervious ground surfacing (i.e., pavement) should be minimized. Wetland hydrologists may need to be consulted to determine how to protect wetland hydrology.
- Maintain water quality. Wetlands store and filter water, and maintain water quality; therefore, the addition of urban storm drainage, agricultural runoff, and sediment from road building into wetlands should be prevented. Wetlands that have artificially high nutrient levels may experience algal blooms, and vegetation in some marshes may convert from sedges or rushes to cattails.
- Restrict recreational access. Intensive recreational use of shoreline areas can reduce plant cover, compact soil, and disturb wildlife. Roots of trees and shrubs can be easily damaged

by trampling and trail development in the moist soils of wetlands. Trails often become wide in wet, muddy areas, and sediments from trail damage may affect amphibians and insects. Motorized recreation, mountain biking, and horseback riding should be excluded from wetlands. Many recreational activities can potentially introduce or spread invasive species. In areas where trails to viewpoints in wetlands are desired, raised boardwalks should be used (avoid using rock or bark mulch on trails).

- Manage livestock access. Livestock use of many wetlands and ponds for water has significantly altered these sites. Overuse of wetlands by livestock can lead to soil compaction, damage and loss of vegetation cover and structure, and introductions of invasive plant species. Shrub and graminoid vegetation on many sites quickly recovers, however, when cattle use is reduced. Alternative watering sites, and fencing to allow a single access point to the water source can be used to maintain wetland functions and values while allowing some cattle use.
- Prevent disturbance of nesting or breeding areas. Recreational activities along wetland edges and canoeing in wetlands can impact amphibians, nesting waterfowl, and other birds, and thus, should be avoided during the breeding season (May through August). Disturbance of soils around wetlands, especially sandy soils that might be used by painted turtles for egg-laying, should also be avoided.
- Restrain pets near wetlands during spring and summer. Pets should be controlled to avoid disturbances to amphibians, waterfowl, and other birds during the breeding season (May through August).
- Allow natural wetland processes to maintain wetland functions and values. Beaver activity, flooding, seasonal drawdown, and groundwater recharge and discharge should be maintained. Inflow or outflow streams should not be diked or channelized.
- Avoid use of pesticides in or near wetlands.

APPENDIX 3

TERRESTRIAL ECOSYSTEMS DEVELOPMENT PERMIT OBJECTIVES AND DESIGN GUIDELINES.

Terrestrial Ecosystems Development Permit Objectives and Design Guidelines.

The Terrestrial Ecosystem Development Permit Area is designated in accordance with the *Local Government Act* for purpose of protection of the natural environment, its ecosystems and biological diversity and, protection of development from hazardous conditions. The Central Okanagan basin of British Columbia is an area of great ecological significance within both the Province of B.C. and Canada as a whole. It is an area with high biodiversity values, and many rare and endangered ecosystems, plant and animal species. A 'sensitive' ecosystem is one that is ecologically fragile and/or is recognized as rare in the provincial landscape. Rare ecosystems are those that are considered to be provincially rare either because of limited distribution or because disturbance has significantly limited their distribution. The Regional District of Central Okanagan is committed to the protection of identified areas of high ecological and natural value. Terrestrial ecosystems in the Central Okanagan support a number of Red and Blue-listed (rare and endangered) species and are a critical component to the health, vitality and economy of the local community. Sensitive ecosystems may be severely influenced by development unless there is effective community stewardship and land use planning.

Objectives

There are essentially two (2) objectives, both with the overriding goal of conserving important natural environments for current and future generations:

- To ensure that sensitive environments are identified and protected in areas that may be subject to future rural subdivision (as shown in the future land use designations and map of this OCP).

- To encourage and support the current rural and resort use of land in a way that best conserves important and vanishing environments. The Development Permit Area is established to include Coniferous Woodland, Broadleaf Woodland, Grassland, Sparsely Vegetated, and Mature Forest Ecosystems identified in the Sensitive Ecosystem Inventory: Central Okanagan. Copies of the inventory are available upon request to Regional District of Central Okanagan.

Other objectives include:

- To protect the ecological attributes and socio-economic values that are common to all Sensitive Terrestrial Ecosystems.
- To conserve Sensitive Terrestrial Ecosystems in a relatively natural state while supporting rural and resort land uses.

- To plan land development and new subdivisions carefully in a manner that protects Sensitive Terrestrial Ecosystems.
- To protect Sensitive Terrestrial Ecosystems through the use of buffers.
- To identify feasible habitat corridors connecting core conservation and significant habitat areas.
- Incorporate wildfire management in a way sensitive to the ecosystem that mimics the effect of the natural fire cycles that once occurred in the Okanagan and helped to shape and maintain the natural balance.

Terrestrial Ecosystem Development Permit Area Guidelines

- Plan land development carefully in a manner that is sensitive to the surrounding natural landscape.
- Discourage settlement, construction, land disturbance, and other development within or directly adjacent to Sensitive Terrestrial Ecosystems.
- Concentrations of high quality ecosystems and habitat for rare species should be prioritized for conservation.
- Delineate buffers around Sensitive Terrestrial Ecosystems. Fencing may be necessary along some buffers where further adjacent development and activity is anticipated, provided that fencing does not obstruct important wildlife movement corridors.
- Avoid the creation of isolated islands of ecosystems. Delineate corridors between Sensitive Terrestrial Ecosystems to create interconnectedness especially for critical wildlife travel routes.
- Conserve snags and standing dead trees where safe to do so. Soft decaying wood is a valuable home and food source for many birds and animals. For some species it is essential. Standing dead trees are typically topped to within 6 metres of the ground in an area that is safe should it eventually fall. It is recognized that dead wood decays over time and the eventual removal of standing dead wood and snags is acceptable. Locate settlements, drives, construction and other development away from existing large, old trees and snags. Artificial snags can be located in safe areas to help improve habitat.
- Plan, design and implement land development and subdivision to protect Endangered, Threatened, or Vulnerable species or plant communities. Avoid disturbance to sites where Rare plants are growing and where rare natural plant communities occur, and maintain critical habitat structures such as old trees, snags, trees with cavities, natural grasslands.
- Conserving trees in communities (groups of trees along with their associated understory) rather than isolating individual specimens is preferred. Groups of trees form a larger intact ecosystem and are more likely to maintain the important characteristics of the ecosystem over time than a few scattered trees. However, some ecosystems are characterized by or may contain some isolated trees and their conservation as well is important.

- The conservation of trees should extend beyond the drip line of the tree. The roots of established trees are very sensitive. A trees root system on the surface and below ground may be larger than the part of the tree you see above ground. Damage to the roots (especially in mature trees) can impede the trees ability to obtain water and nutrition and may eventually kill the tree. The drip line is an imaginary line drawn around the tree(s) outside the full extent of the branches.
- Maintain water quality. Water quality can be affected by excessive land alteration, erosion, and the improper use and storage of chemicals and hazardous materials.
- Prevent disturbance of nesting sites and breeding areas. It is important that animals have the habitat that supports their reproduction and so ensures future generations.
- Control invasive species.
- Restore native vegetation where it has been disturbed.
- Carry out erosion and sedimentation control measures to prevent ecosystem degradation.
- Restore the effects of the natural cycle of low intensity fire once common to the Okanagan. The suppression of fire by mankind has dramatically altered the ecology of the valley as well as increased the available fuel for wildfire. Wildfire hazard mitigation can happen in an environmentally sensitive way that restores ecosystems to the natural condition that would be expected if the normal cycle of fire was permitted to affect the environment.
- Identify critical habitat. Where disturbance cannot be mitigated it may be acceptable, at the discretion of the RDCO, to do environmental improvements off the property in compensation for loss on-site with the intention of no net loss of critical habitat overall.

Specific Guidelines

The following specific objectives and specific guidelines pertain to the specific ecosystems as identified by the site-specific assessment or by the Sensitive Ecosystem Inventory. They are in addition to the Overall Objectives and Overall Guidelines and relate to the important characteristics of that particular ecosystem.

Coniferous Woodlands

Characteristics – Coniferous woodland ecosystems in the study area have open coniferous tree canopies. They occur in drier climates, on rocky knolls, and on steep south-facing slopes where limited moisture or shallow soil limited tree establishment. These ecosystems have scattered ponderosa pine and interior Douglas-fir trees, and saskatoon growing in rock fractures with patches of grasses and forbs in shallow soil pockets. Historically, these ecosystems would have burned frequently, except on sites with minimal vegetation and lots of exposed rock. Fire exclusion has resulted in forest ingrowth on some sites (Min. of Environment – SEI).

Importance – Coniferous woodland ecosystems comprised the largest sensitive ecosystems category with the Central Okanagan Sensitive Ecosystem Inventory. Mature woodlands are a high priority for conservation and preservation. Younger structural stages can be important in forming buffers and providing recruitment for older structural stages. Although areas of coniferous woodlands and

mature forests remain, many have been altered significantly through selective logging and fire exclusion and furthermore have been degraded by fragmentation, human use, in growth, and invasive plants (weeds).

Specific Coniferous Woodlands Objectives

- Delineate buffers around coniferous woodland ecosystems
- Avoid direct and indirect impacts
- Plan land development carefully

Specific Coniferous Woodlands Guidelines

- Buffer to prevent invasive weed species & help maintain ecological viability and connectivity to other ecosystems
- Discourage human settlement or development
- Manage access
- Prevent soil disturbance
- Require an ecological inventory be conducted by qualified professional
- Design and implement land development activities to protect

Broadleaf Woodland Ecosystem

Characteristics – Broadleaf woodland ecosystems are where the natural changes in the ecological community over time have resulted in mature broadleaf woodlands as the climax stage of succession (the long term stable ecosystem for the site). Typically these are areas dominated by trembling aspen and other broadleaved trees and shrubs. Broadleaf woodlands are located in broad, moist depressions or areas of subsurface water seepage and may occur adjacent to riparian ecosystems. This ecosystem can have an understory that is predominantly shrubby with Saskatoon bushes, snowberry bushes, Oregon grape, or grassland. Soils tend to be rich due to decomposing leaf litter and nutrients carried to the site by moisture. These sites are very rare and important ground water (aquifer) recharge areas as well as habitat. The tree cavities found in broadleaved woodlands are important nesting habitat.

Importance – According to the Sensitive Ecosystem Inventory the importance of this ecosystem includes its extreme rarity (covering only 0.3% of the SEI study area), high biodiversity, specialized habitat (many species depend on features found only in broadleaf woodlands), fragility (the water seepage makes the soils very vulnerable) as well as social and visual values.

Objectives specific to this ecosystem

- To conserve, intact, as much of the ecosystem as possible

- Where there are changes intended, maintain the key characteristics of the ecosystem as much as possible including:

  - Aspen and other broadleaf trees and their root systems,
  - A single layered high canopy,
  - A complex understory of grasses and shrubs,
  - Extensive and thick leaf litter (or other organic matter) surface layer
  - Fragile underlying wetlands and seepage areas.

- There is potential that changes may actually help improve and restore this ecosystem by removing the ingrowth of young coniferous trees that natural fires would have normally periodically cleared out.

Specific Broadleaf Woodland Guidelines:

- Protect nesting and denning sites that were identified on site through an initial reconnaissance or in the ecological inventory. It is important for animals and birds to reproduce and ensure future generations. Important features include dens, raptor nest or perch trees, owl roosts, woodpecker cavities and bat roosts. Cavities in aspen trees are an important unique feature of the broadleaf woodland.

- Conserve soil leaf litter and fallen debris. The decay of fallen vegetation is an important source of nutrients as well as habitat and protection for animals.

- Should the removal of dangerous trees or encroaching coniferous trees be necessary, when choosing trees to thin or remove maintain the high canopy layer of the forest and its filtered sunlight affect. Choose trees carefully in a way that maintains the key characteristics of the broadleaf woodland ecosystem.

- Maintain habitat structures

Grassland Ecosystems

Characteristics – Grasslands are dominated by bunchgrasses with scattered broadleaf perennials and wildflowers. Grasslands are found in dry areas where frequent, low intensity natural fires historically occurred. There are two categories of grassland. "Grassland" ecosystems are open and dominated by grasses and wildflowers with a surface mulch of decaying vegetation, lichens and mosses. "Shrubland" ecosystems are grasslands that contain shrubs such as snowberry, saskatoon berry, and roses. This ecosystem is typically not as dry as the grassland ecosystem and so can sustain some scattered shrubs. The soils of the shrubland ecosystem are typically richer than open grasslands.

Importance – Rarity in North Westside OCP Area, high biodiversity, high sensitivity to disturbance (due to very fragile soils), as well as social and visual values.

Specific Grassland Ecosystem Objectives

- To conserve, intact, as much of the ecosystem as possible.
- Limit disturbance. Because of the lack of moisture and the poor nature of the soils disturbance in the grassland ecosystem can damage the thin crust of viable soil and recovery is very tenuous and slow.
- Where there are changes intended, maintain the key characteristics of the ecosystem as much as possible;
- a predominance of native grasses and perennials (with some scattered shrubs on the moister sites with better soils),
- Conservation of the vital thin active surface soil layer.
- Remove invasive weeds and maintain a healthy ecosystem so that invasive weeds cannot re-establish themselves.
- There is potential that changes may actually help improve and restore this ecosystem by removing the ingrowth of young trees encroaching into the grasslands that natural fires would have normally periodically cleared out.

Specific Grassland Ecosystem Guidelines

- Protect nesting and denning sites that were identified on site through an initial reconnaissance or in the ecological inventory. It is important for animals and birds to reproduce and ensure future generations. Many grassland birds are ground nesters.
- Manage access to minimize vehicular and livestock access. The root systems and thin soils of grasslands are sensitive to disturbance and rely on a very thin active layer of the soil. This ecosystem is one of the most sensitive to surface disturbance.
- Protect large old trees (and their root systems) and snags. Such isolated trees scattered through the grasslands provide shelter, nesting habitat, and food source for wildlife.
- Minimize soil disturbance.
- Manage livestock use. Overgrazing can seriously damage or destroy native grasslands. Also the poor timing of grazing can mean that native plants cannot reproduce or suffer damage. Excessive or improper grazing can cause enough damage to allow invasive weeds (often detrimental to grazing animals) to colonize an area.
- Encourage the maintenance of natural sites and the planting of gardens with native, dry land species. This can actually extend habitat for native birds and animals into the backyard.
- The removal of invasive weeds and the restoration of the grassland is a priority.

Sparsely Vegetated Cliff and Rock Ecosystems

Characteristics – Sparsely vegetated cliff and rock ecosystems occur on sites where rock, cliffs, or talus slopes only allow for discontinuous vegetation cover interspersed with bedrock or blocks of rock. This ecosystem provides protected shelves and crevices that are important for shelter, breeding, and overwintering for a variety of reptiles, animals and birds. Slopes with a warm orientation are especially important.

Importance – Extreme rarity (confirm abundance), high biodiversity, specialized habitat (a number of species including some threatened or endangered species are dependant on these habitats), as well as social and visual values.

Specific Sparsely Vegetated Cliff and Rock Ecosystems Objectives

- To conserve, intact, as much of the ecosystem as possible
- Where there are changes intended, maintain the key characteristics of the ecosystem as much as possible;
- Exposed rough rock and its surrounding plant community;
- Talus slopes and debris accumulation at the base of cliffs and rock outcrops;
- Access to and from the area for wildlife that needs this as essential habitat; and
- Future protection from disturbance.

Specific Sparsely Vegetated Cliff and Rock Ecosystems Guidelines

- Protect nesting and denning sites that were identified on site through an initial reconnaissance or in the ecological inventory. It is important for animals and birds to reproduce and ensure future generations. Important features include hibernacula (hibernation chambers) for snakes and reptiles, raptor nests or perch trees, nesting cavities, woodpecker cavities, and bat roosts.
- Manage access to minimize vehicular and livestock access. Avoid roads near hibernacula and prevent the disturbance of snake hibernacula. Manage road location to prevent snake mortality.
- Minimize soil disturbances and minimize disturbance of rock debris.
- Plan, design and implement land development and subdivision to protect endangered, threatened, or vulnerable species or plant communities. Avoid disturbance to sites where rare plants are growing and where rare natural plant communities occur, and maintain habitat structures such as talus slopes at the base of rock outcrops, steep faces or rock outcrops and cliffs, scattered large old trees and snags.
- Protect large old trees (and their root systems) and snags. Such isolated trees scattered through the sparsely vegetated areas provide shelter, nesting habitat, and food source for wildlife. Discourage rock climbing in areas that have not been

assessed for important habitat considerations. Do not allow rock climbing in important nesting, denning and other habitat features when identified.

APPENDIX 4

HILLSIDE DEVELOPMENT PERMIT AREA OBJECTIVES AND DESIGN GUIDELINES

Hillside Development Permit Area Objectives and Design Guidelines

Hillsides are important, visually dominant features in the Okanagan. Hillside locations can also be subject to hazards and adverse impacts from subdivision and road building. It is important that future subdivision or proposed major landform changes on the OCP area hillsides be undertaken sensitively, in consideration of environmental and visual impact, and also in consideration of the potential impact on neighbouring properties.

Objectives

- To support rural subdivision, road building and construction on hillsides that protects and enhances the natural characteristics of the hillsides which are a significant component of the OCP area.

- To support rural subdivision, road building and construction on hillsides in a manner that minimizes damage to property (both the property under application and neighbouring property) from erosion, soil instability, rock fall, or other identified hazard.

- To support rural subdivision, road building and construction on hillsides in a manner that is sensitive to the natural topography and maximizes the retention of existing landscape, vegetation and soils.

- To support rural subdivision, road building and construction on hillsides in a manner that is responsive to the natural environment and drainage patterns.

Hillside Development Permit Area Guidelines

The following guidelines apply within the Hillside Development Permit Area:

- Require all areas with slopes, greater than or equal to 30%, be investigated as hazardous, environmental, and visually sensitive lands and a no-build/no-disturb covenant considered as part of the zoning, subdivision or building permit approval process.

- Development opportunities, constraints and conditions of design will be identified on the basis of a topographic and feature survey showing natural slope contours (in 2 to 5 meter contour intervals), spot elevations, swales, knolls, ridgelines, bedrock outcrops, cliffs and slope transitions, seasonal and permanent watercourses, drainage routes, vegetation, top of bank, and break lines.

- The topographic survey will include current and future roads (public, strata, and forest), site grading and post development contours (in 2 to 5 meter contour intervals), water intakes on or adjacent to the development site, prominent views, and will identify potential hazards to neighbouring properties from existing or future development.

- A plan of site remediation including but not limited to; sensitive grading, revegetation (reflecting the Okanagan Landscape), erosion control, and soil amelioration, prepared by the appropriate professional (registered landscape architect, professional forester) should be provided in advance of any site grading or removal of forest vegetation.

- The pattern of development should be responsive to the varied topography and natural landscape. Changes to existing terrain should be kept to a minimum.

- Cluster developments on steep slopes, in a manner which responds to the site's natural contours and preserves more unbuilt open space for conservation or recreation/amenity space.

- Roads, access, and driveways should follow topography and avoid excessive cut and fills. Roads are encouraged to incorporate gentle curves and avoid long stretches of straight road.

- A reduction of road widths for local roads in order to reduce construction impact may be considered subject to agreement by the road authority.

- The impact of road design on potential road access to neighbouring lands beyond should be considered in accordance with the principles of these guidelines.

- Fill or cut slopes exceeding 10 metres in vertical height should be graded to resemble naturally occurring terrain and revegetated.

- Cut and fill slopes and road construction should be safe and not create a hazard of debris torrent or landslide.

- Hillside development must preserve or protect unique or special natural features of the site, such as land forms, rock outcroppings, mature trees and vegetation, natural drainage, hilltops and ridge lines.

- Manmade storm drainage and retention ponds should have a natural appearance and restored to the condition of natural environment. Drainage should be designed as natural environmental corridors wherever possible.

- Drainage flow rates offsite should be retained as close as possible to pre-development conditions and drainage retention and detention is encouraged.

- The protection of water quality should be ensured.

APPENDIX 5

WILDFIRE INTERFACE CONSTRUCTION DEVELOPMENT PERMIT OBJECTIVES AND DESIGN GUIDELINES

Wildfire Interface Construction Development Permit Objectives and Design Guidelines

These Design Guidelines will be used in reviewing Development Permit applications. It is important that construction within the Wildfire Interface Construction Development Permit Area designated in the Official Community Plan show a consideration of these guidelines. While these guidelines directly apply only to development permit areas, the recommendations for the reduction of wildfire hazard would be wise considerations for many homeowners in the Regional District. Flying embers can ignite structures up to 1.5 kilometres from the fire source.

In the fall of 2009, the RDCO began developing a Community Wildfire Protection Plan (CWPP). The recommendations in the final CWPP have been approved and the following guidelines and associated policies are to be considered in conjunction with the approved CWPP. .

Introduction

The Okanagan has a naturally dry climate and a large community interface with forested land. Homes have been lost to wildfire and it will be an ever-present danger in the valley.

An important part of reducing wildfire hazard involves modifying how individual homes are constructed near areas of forested public land such as provincial forest or large forested parks. The accumulation of small choices such as siding material, building material, screening of soffits, screening the tops of chimneys, using non-combustible landscape mulch, and the choice of landscape plants, can add up to either saving or losing a home to wildfire. The basis for the Guidelines is the document "Fire Smart, Protecting Your Community from Wildfire" supported by the Alberta Department of Sustainable Resource Development, the British Columbia Forest Service, Natural Resources Canada, most Canadian provinces and endorsed by the report of the Province of BC "2003 Firestorm Provincial Review".

The design guidelines do not cover all measures for wildfire hazard reduction possible but are minimum standards that focus mainly on new home construction, large additions, and their immediate vicinity. A good source for additional information is www.for.gov.bc.ca/protect/safety/. The Development Services Department of the Regional District also has brochures available.

Zones of Fuel Management

The design guidelines are based upon the typical Priority 1 zone of 10 metres from the building established for flat land. While these guidelines represent some minimum requirements, it is advisable to consider a larger Priority 1 zone for properties on a slope, especially on the downhill side. There are three priority areas as outlined in "Fire Smart, Protecting Your Community from Wildfire":

Priority 1 zone is within 10 metres (30 feet) of a building and is the most critical zone. The development permit deals only with this area. While these design guidelines deal with the typical situation, a property owner may wish to consider widening the priority area if located on a slope, especially on the downhill side.

Priority 2 zone begins 10 metres (30 feet) from a building and extends to 30 metres (100 feet) depending upon topography. The more the land slopes, the more the zone should be extended. Radiant heat and burning embers originating from an area this close to a structure may cause it to burn. Vegetation and potential fuels in this area should be managed to reduce fire intensity and rate of spread by methods such as removing dead needles, dead wood and combustible debris from the ground, removing any tree limbs within 2 metres of the ground, and spacing trees so that no tree limb is closer than 3 metres to the next.

Priority 3 zone begins 30 metres from a building and extend to 200 metres or more. High intensity crown fires that occur in this zone may be a potential high source of burning embers.

Objective

- The objective is to reduce the susceptibility to wildfire of new construction or large additions near the provincial forest interface, or the interface with large forested parks.

Wildfire Interface Development Permit Design Guidelines

Roofing – The roof covering shall conform to Class A, B or C fire resistance as defined in the BC Building Code.

Roofs catching fire are the number one cause of building losses during a wildfire event. The roof presents a large, flat area that fire embers can land on and start a new fire. Roofing material has several classifications with Class A being the most fire resistant. Some materials that either fall within the rating system or, can be obtained in forms that meet Class A, B or C requirements, include composite (asphalt and fibreglass) shingles, concrete or clay tile, metal roofing, and wood shake roofing.

Exterior Wall Finishes – Any material used for exterior wall finishes should be fire resistant such as stucco, metal siding, brick, cement shingles, concrete block, poured concrete, logs or heavy timbers as defined in the BC Building Code, and rock.

Second only to the roof material, siding material is the part of the building most prone to ignite in a wildfire event. The intense heat of the fire itself, fire embers, and burning vegetation at the base of the wall, can individually or all together cause the side of a building to catch fire.

Chimneys – All chimneys should have spark arrestors made of 12 gauge (or better) welded or woven wire mesh with mesh openings of less than 12 millimetres.

Chimneys can present a serious hazard as a source of sparks that can start fires, and as a way for burning embers to enter a building.

Eaves, vents, and openings – All eaves, attic and under floor openings should be screened with corrosion-resistant, 3-millimetre non-combustible wire mesh (as a minimum).

Vents are important for the healthy air exchange and moisture escape required in a building. They also are ready-made accesses into a building. Unprotected eaves can allow burning embers to enter and also allow flames that are spreading up a wall to penetrate into the roof structure.

Windows and glazing – All windows must be double paned or tempered

Glass can be shattered by the heat of a fire and create openings for fire and burning debris to enter the building. It is highly unlikely that an interior will ignite from thermal radiation through intact glass.

A single pane thickness of glass is most susceptible to collapse. The larger the pane of glass, the more likely it is to shatter.

Balconies, decks and porches –

- Decks should be constructed of heavy timber as defined in the BC Building Code, or, with 1-hour fire resistant rated assemblies or non-combustible construction as defined by the BC Building Code.
- Manufactured homes should be skirted with a fire resistant material as outlined in the previous guideline for exterior wall finishes.

As with roofs, decks present a large horizontal surface for burning embers to land on and take hold. In addition, decks have an undersurface that also can be a source of fuel for fires. It is important to consider the vulnerability of decks to fire from both above and below.

Landscaping on the property within 10 metres (Priority 1 zone) of a building shall not include coniferous evergreen shrubs such as junipers, mugo pines, or coniferous evergreen hedges.

There are three priority zones for the modification of vegetation to reduce wildfire hazard. Priority Zone 1, the most important, is within 10 metres (30 feet) of the building. Without fuel modification in this critical area, the fire intensity and the rate of spread can make firefighting difficult or impossible.

Coniferous evergreen shrubs are resinous and have a large surface area. They are an excellent fuel for fire and can be a source of flames and sparks that can enter a building. Coniferous evergreen shrubs can also be a source of heat that can burn or melt materials and shatter windows.

It is important to choose plants that are less combustible and burn with less intensity. Deciduous shrubs (shrubs that lose their leaves in the winter), broad-leaved evergreen shrubs (such as bearberry, Oregon grape, cotoneaster, rhododendrons, etc.), perennials, annuals and trimmed grass are preferred.

No additional or new coniferous evergreen trees are to be planted within 10 metres of the building. It is not advisable to retain previously existing mature coniferous evergreen trees within 10 metres (Priority 1 zone) of the building. Any coniferous evergreen trees that are to be retained on the property that lie within 10 metres (Priority 1 zone) of the building must;

- Have limbs pruned such that they are at least 2 meters above the ground.
- Be spaced so that they have 3 metres between crowns. (In other words, the tips of the branches of a tree are no closer than 3 meters to the tips of the branches of another).
- No limbs should be within 3 meters of the building or attachments such as balconies.

Evergreen trees contain resin, have needles that provide a lot of surface area, and are excellent fuel for fires. Close to a building, they act as a ladder that allows the fire to climb onto the building, under eaves and leap onto roofs. They can also be a source of heat that shatters windows. Deciduous trees are a safer alternative in the Priority 1 area. However, the measures outlined here somewhat limit the hazard should the choice be made to retain pre-existing evergreen trees in the Priority 1 area. White pine, ponderosa pine and western larch have a medium flammability while most other coniferous evergreens are highly flammability.

Landscaping on the property within 10 metres (Priority 1 zone) of a building shall use only non-combustible landscape mulches.

Areas covered with landscape mulches are a large horizontal surface for embers to land on, much like roofs and decks. Some commonly used mulch, such as bark chips, are also highly flammable. The combination of flammability and a large surface area creates a perfect environment for fire. Combustible fuel sources should not be located next to a building. Various sizes and colours of landscape rock are a common alternative. Another ground covering choice is low-lying plants that are either deciduous (lose their leaves in the fall), or broadleaved evergreen, trimmed grass, annuals or perennials. The use of landscape fabric can reduce the need for a very thick layer of mulch.

APPENDIX 6

KOKANEE SHORESPAWNING ZONES (ADAPTED FROM THE MINISTRY OF ENVIRONMENT), SHORELINE DEVELOPMENT, AND IDENTIFICATION OF SHORELINE ZONES FOR USE IN THE RDCO OFFICIAL COMMUNITY PLAN

KOKANEE SHORESPAWNING ZONES (Adapted from the Ministry of Environment), SHORELINE DEVELOPMENT, and IDENTIFICATION of SHORELINE ZONES for Use in the RDCO Official Community Plan

Foreshore and riparian areas are important to fish and wildlife species, including species at risk. During the planning and evaluation of works affecting the foreshore, consideration will be given to ensuring that any works do not impose direct or long term cumulative impacts to fish and wildlife species and their habitats. The Okanagan Shuswap Land and Resource Management Plan (OSLRMP) provides strategic direction for the management of large lake shorelines and associated fish habitat, above and below the high water mark (HWM). The OSLRMP directs agencies to manage proactively through identification of fisheries management zones, guide lakeshore development so as to reduce or avoid impacts to sensitive fish habitats, and minimize the potential for cumulative impacts resulting from individual projects. There is also direction to manage the lakeshore in a cooperative manner between all levels of government. This approach is consistent with the Ministry of Environment's shared stewardship model to protect the natural resources of British Columbia. This includes an increased emphasis on fostering stewardship and cooperative approaches to environmental management through collaboration, information sharing, education and use of Best Management Practices (BMPs).

This information is intended to assist provincial and federal agencies, local governments, and the general public during the planning of developments, land use planning (e.g. zoning) and/or the adjudication of applications for specific development activities (e.g. applications for foreshore leases for docks, boat launches or marinas). The Ministry of Environment (MOE) continues to update information related to shore-spawning fish habitat and inventories for species at risk. This document identifies the risks to fish and species at risk and their habitats based on specific development activity.

Knowledge of this information in the early planning stages can be beneficial in choosing an appropriate site or activity. The MOE has adopted the use of a risk matrix for species at risk and the habitat protection provisions of section 35 (1) & (2) of the *Fisheries Act*. At this time review of all proposals for works below the HWM on Okanagan Lake will be follow this protocol. In the development of this protocol foreshore sensitivity maps, risk ratings for specific development activities, and preferred procedures and practices have been developed. Responding to the MOE protocol for works below the Okanagan Lake High Water Level, adjacent upland activities and land use planning exercises should closely consider foreshore sensitivities, ecological values and potential development constraints. This may be particularly relevant with regards to moorage development or

expansion along shorelines with known high (Red Zone) and very high (Black Zone) Kokanee shorespawning use intensity.

Within Okanagan Lake, Foreshore Sensitivity Maps have been categorized into 4 zones based on development activity risk, using Kokanee spawning data, other fish habitat data, and known occurrences of species at risk (SAR).

i) BLACK (Critical Habitat)

Black Zones are critical for Okanagan Lake shore spawning Kokanee. Recent (2001-2008) Kokanee shore spawning inventory data was used to identify where aggregations of 1000 or greater spawning fish were observed. Development is to be avoided or moved to a lower risk area. There is a high likelihood that a request for a HADD authorization under Section 35(2) of the *Fisheries Act* would be triggered with all works within this zone.

ii) RED (High to very high value habitat)

Red Zones are recognized as being very important for the long-term maintenance of Kokanee productivity in these lakes. Recent (2001-2008) Kokanee shore spawning inventory data was used to identify where aggregations of greater than 50 spawning fish were observed. Historical data (1974-1980) was used to identify where aggregations of 1000 or greater spawning fish were observed. In addition, the Red Zone includes the mouth of all Kokanee spawning streams and known occurrences of select species at risk. Depending on the risk rating of the activity, development is to be avoided or moved to a lower risk area.

Based on the Federal Fisheries Act and Project Review Process compensation is not an option for the loss of critical habitats or for the loss of habitat productive capacity due to deposition of deleterious substances in any type of habitat. Critical habitats are most often included in the Black Zone, but may also occur in the Red Zone.

iii) YELLOW (Moderate, with some high value habitat)

Yellow Zones represent high to moderate value habitat required for the long term maintenance and recovery of Kokanee productivity in these lakes. These areas were identified from: recent (2001-2008) Kokanee shore spawning data where aggregations of 50, or fewer, fish were observed; documented historic shore spawning activity with aggregations of less than 1000 fish; the proximity to the mouth of streams; or locations of western ridged mussel shells. Activities in this zone are to follow the protocol provided in this document.

iv) NO COLOUR (unclassified or low value habitat)

Kokanee spawning data is based upon current usage from a depressed population. As stocks recover it is possible that some areas within the yellow zone could change to a Red designation. Therefore, it is important that the most current version of the foreshore sensitivity mapping is applied. If there is a discrepancy between appropriateness of activity, procedures or practices, the higher protection standard is to be applied.

These are areas where no recent or historic shore spawning is known to occur. Certain development activities can have impacts to adjacent fish habitats. In this zone approving agencies are to ensure that applicable BMPs are applied and/or a qualified professional has been engaged.

Risk

Activities Risk, in this context, is based on "likelihood" of impact and "magnitude" of impact for each of the development activities based on the underlying habitat use or characteristics. Risk ratings have considered the ability to reduce impacts through the use of mitigation measures, such as those provided in BMPs. Where the underlying values are high, and the mitigation for the activity is less certain, the risk of impacts resulting from the development is higher. Alternatively, if the underlying values are lower, and/or the mitigation is more certain, the risk of that development activity impacting the habitat is lower.

Varying from the BMP should only occur with low or moderate risk rated activities.

There is a high likelihood that a request for a HADD authorization under Section 35(2) of the *Fisheries Act* would be triggered with "Very High" and "High" risk development activities within any of these zones.

Protocol for Works

The MOE will evaluate proposals below the HWL based on Fisheries and Oceans Canada (DFO) sequence of mitigation options.

These elements should be incorporated into Professional Reports and Development Permit Guidelines:

1. Avoidance of impacts;
2. Minimization of unavoidable impacts; and
3. Compensation for residual impacts that cannot be minimized.

STEP 1: From the mapping, determine what zone the application occurs within.

STEP 2: Determine if development activity can be moved to a lower sensitivity zone (e.g. from Red to Yellow or No Colour).

STEP 3: Determine what the activity risk rating from Table 1. If the activity is not listed, contact the MOE office for advice.

STEP 4: Determine if the risk can be reduced through an alternate activity (eg. type of erosion protection).

STEP 5: Follow procedures described for each sensitivity zone and applicable activity risk. Where several activities with differing risk factors occur as a result of one project, the potential for cumulative impact may increase the risk and move the activity into a higher risk.

Activities with a Very High Risk Rating

The provincial opinion is that development activities that result in a "very high" (VH) risk rating raise significant concerns. Proposals in the VH risk category have significant challenges related to providing adequate mitigation or compensation to address the loss of values associated with such development, and to the costs to implement acceptable mitigation measures. In addition, there is a high likelihood that a request for a HADD authorization under Sec 35(2) of the *Fisheries Act* would be triggered.

Proponents are strongly encouraged to avoid activities with a VH risk associated with them, revising those activities to a lower risk option, or relocating that activity to an area where the overall activity risk is lowered.

Activities with High Risk Rating

The sequence of mitigation steps is to be followed for activities/zones with a "high" (H) risk rating. If the activity cannot be avoided, the proponent is to engage a QP to determine appropriate mitigation for the site. QPs must include a completed checklist in the submission. If the mitigation will not eliminate the risk of a HADD, then a HADD authorization process will be required.

Activities with Moderate or Low Risk Rating

Activities with "moderate" (M) or "low" (L) risk rating are to follow applicable BMPs. If works are inconsistent with the BMPs the proponent is to engage a QP to ensure that the appropriate level of protection is provided through science based alternatives and that legislative requirements are being met. If this is not possible, then a HADD authorization may be required. QEP's must include a completed checklist in the submission.

If the QEP assessment determines that a harmful alteration, disruption or destruction of fish habitat (HADD) is likely to occur, the "no net loss" procedure must be demonstrated should the proponent wish to proceed with applying for an authorization under Section 35(2) of the *Fisheries Act*.

Table 1. Ministry of Environment Risk Assessment for Development Activities below the High water Level.				
	Foreshore Colour Zone			
Activity	Black	Red	Yellow	No colour
Dock	VH	H	H	L
Marina[1]	VH	VH	H	M
Boat launch upgrade	H	H	H	M
New boat launch	VH	VH	H	M
Waterline drilled	M	M	M	L
Dredging	VH	VH	H	M
Waterline trenched	VH	VH	H	M
Geothermal loops	VH	VH	H	L
Infill	VH	VH	VH	H
Piled structure	VH	VH	H	H
Erosion protection (soft-bioengineered)	M	M	L	L
Erosion protection hard-joint planted	H	H	H	M
Erosion protection vertical wall or retaining wall	VH	VH	VH	H
Permanent rail launch system	VH	H	H	M
Removable rail launch system	H	M	M	L
Beach Creation below HWM	VH	VH	VH	VH
Milfoil & Invasive weed removal	H	H	M	L
Aquatic vegetation removal**	VH	VH	H	H
Boardwalk below HWM	VH	VH	H	H
Mooring buoy	H	M	M	L

[1.] Marina = Commercial Moorage = Strata marina or commercial wharf

The provincial opinion is that activities within the VH risk category raise significant concerns. Proposals within the VH risk category have significant challenges related to providing adequate mitigation or compensation to address the loss of values associated with such development and to the costs to implement acceptable mitigative measures. In addition, there is a high likelihood that a request for a HADD authorization under Sec 35(2) of the *Fisheries Act* would be triggered. Proponents are encouraged to avoid activities with a VH risk associated with them or to revise those activities to a lower risk option or to relocate that activity to an area where the overall activity risk is lowered.

The DFO principle of "no net loss", should be applied to proposals within or immediately adjacent to fish habitat. This involves following a progressive sequence of mitigation alternatives, which include: (1) avoidance of impacts, (2) minimization of unavoidable impacts, and (3) compensation for residual impacts that cannot be minimized. It is important to understand that mitigation contains a hierarchy of choices, the first always being avoidance.

Overview of Foreshore Zone Distribution in the North Westside OCP Area

A total of 53 shoreline segments (reaches) were identified along the Okanagan Lake shoreline of the OCP area. As indicated previously, the total shoreline length is about 38.4km. Table 2 summarizes the cumulative shoreline length broken down by Foreshore Zones as identified by the MOE.

Table 2. Analysis of cumulative shoreline length broken down by Foreshore Zones as identified by the MOE. Values shown are not reflective of RDCO FIM mapping (2006) and shore segment data.

Zones (As determined by MOE)	Cumulative Shoreline Length within NORTH WESTSIDE OCPNORTH WESTSIDE OCP Area (km)	Percent of Shoreline
Black	10.6 km	28%
Red	10.8 km	28%
Yellow	8.5 km	22%
No Colour	8.6 km	22%

The current extents of these zones are not based on the shoreline Segments as identified during the Foreshore Inventory and Mapping (Regional District, 2006). Rather these zones are based on the most recent (2008) documented incidents/counts of shorespawning Kokanee. As stocks recover, it is possible that some areas within the Yellow and No Colour zones could change to a Red Zone or even a Black Zone, depending on the number of fish counted. Based on this, the predominant colour zones (Table 3) was calculated and extrapolated the highest current designation (Table 4) within each of the 52 shore segments to the entire segment. This analysis is intended to be reflective of habitat suitability of shore spawning Kokanee since the shoreline and substrate characteristics in individual segments are generally homogenous.

Table 3. Cumulative FIM Segment Length by Predominate Foreshore Colour Zone.

Predom. Colour Zone	Segment Length (km)	Percent of NORTH WESTSIDE OCPNORTH WESTSIDE OCP Shoreline
Black	10.4	27%
Red	12.0	31%
Yellow	7.6	20%
No Colour	8.4	22%

Table 4. Cumulative length of FIM Segments grouped by Maximum Foreshore Colour Zone present in each segment.		
Highest Zone	Cumulative Segment Length (km)	Percent
Black	21.0	55%
Red	9.0	24%
Yellow	6.4	17%
No Colour	1.9	5%

Extrapolation of MOE colour Zones to FIM Lake Segments should be considered as a reflection of Shoreline Habitat Quality. Characterizing individual shoreline segments according to the predominant colour zone (summarized in Table 3) may be an accurate reflection of the Segment's current level of value. However, extrapolating up to the highest assigned score in each segment may better represent a segment's habitat suitability and productive capacity. In developing shoreline leavestrips for the OCP area, the predominant colour zones in each segment were factored into the following Criteria as shown in Table 5.

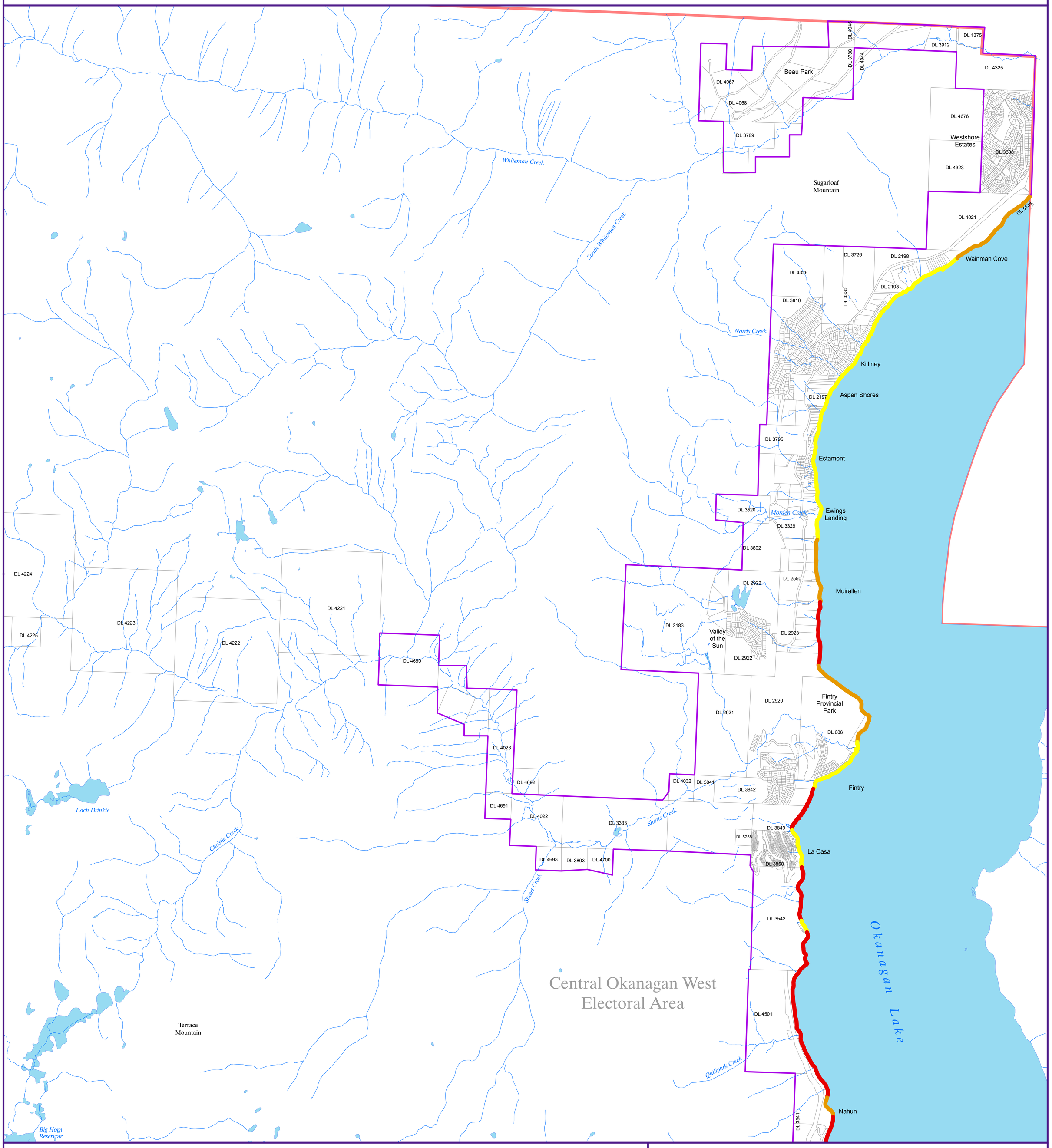
Table 5. Shorezone Sensitivity Rating Criteria for North Westside OCP Area.		
OCP Shore Zone	**Predominant Kokanee Zone in FIM Segment**	**Level of Disturbance**
Red	Black/Red	Shore Segment >80% Natural
Orange	Black/Red	Shore Segment <80% Natural
	Yellow	Shore Segment >80% Natural
Yellow	Yellow/No Colour	Shore Segment <80% Natural

From Table 5, and by adapting shoreline sensitivity and risk ratings from guidance documents Developed for Shuswap Lake, Kootenay Lake, Moyie Lake, and Munroe Lake, the following setbacks (Table 6) have been recommended for respective Shoreline Sensitivity Zones for the Official Community Plan:

Table 6. Recommended shoreline leavstrips/setbacks for the 3-class shoreline sensitivity rating zones.		
Shore Zone	**Minimum Leavestrip**	**Rationale**
Red	30	• Essential for the long term maintenance of fish and/or wildlife values. • Very High Habitat Value because of biophysical characteristics and very low level of Shoreline Disturbance. • Considered integral to the recovery and maintenance Okanagan Lake Kokanee salmon populations.
Orange	20	• High Value Shoreline Area. These are made up of areas that are relatively natural; high value spawning habitats and/or other features that could be impacted by proposed land uses or activities. These areas are sensitive to development, continue to provide important habitat functions, but may be at risk from adjacent development pressures. Restoration opportunities potentially exist in these areas. Proponents should consider moving high risk activities to other areas if possible, or pursuing activities that have lower risks associated
Yellow	15	• Experienced more intensive development disturbance and pressures. • These areas still maintain important general living habitats that are important to fish and wildlife • Development is more appropriate on these shorelines, and should incorporate restoration and protection of habitat features that remain.

The actually mapped Shoreline Sensitivity Zones as shown on Map 6 may vary depending on the 2010 update to the Foreshore Inventory Mapping and discussions with the Province. In the interim, the proposed Shoreline Sensitivity Zones will be used as guidance for site specific development applications and will be subject to consideration from the Province as it relates to the critical black zones identified in the Okanagan Region Large Lakes Foreshore Protocol.

Foreshore Sensitivity Zones



Legend

Shoreline Sensitivity Zones

- **RED ZONE**
- **ORANGE ZONE**
- **YELLOW ZONE**

- **Official Community Plan Boundary**
- **Administration Boundaries**
- **Creeks and Streams**
- **Lakes, Marshes and Wetlands**

1 0.5 0 1 2 3 4 5

Kilometres

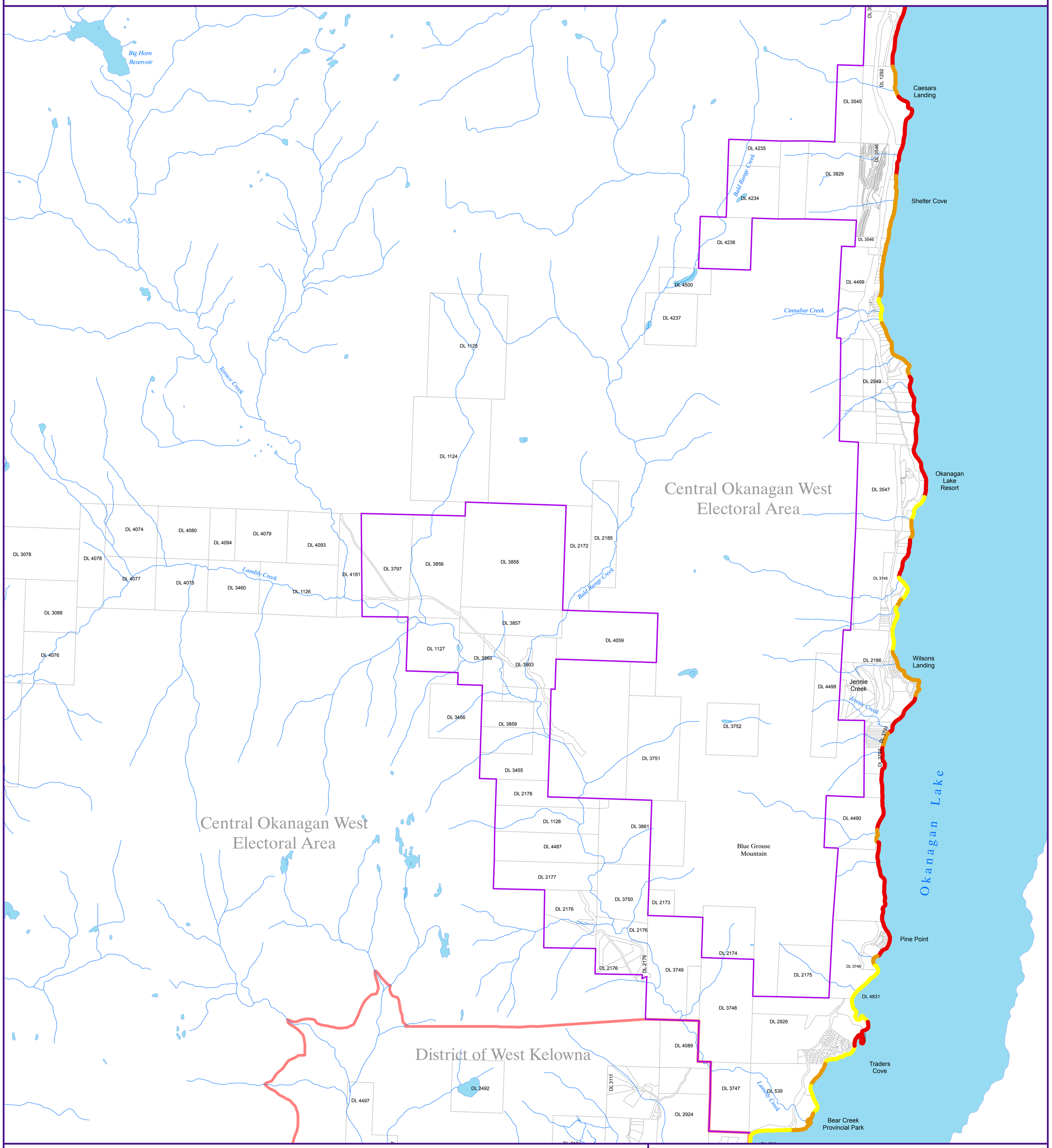
REGIONAL DISTRICT of CENTRAL OKANAGAN

N W E S

Rural Westside Official Community Plan
Appendix 6 (North)

Note:
This map has been consolidated for office purposes.

Foreshore Sensitivity Zones



Legend

Shoreline Sensitivity Zones

- **RED ZONE**
- **ORANGE ZONE**
- **YELLOW ZONE**

- **Official Community Plan Boundary**
- **Municipal Boundary**
- **Creeks and Streams**
- **Lakes, Marshes, and Wetlands**

REGIONAL DISTRICT of CENTRAL OKANAGAN

Rural Westside Official Community Plan
Appendix 6 (South)

Note:
This map has been consolidated for office purposes.